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This paper examines the evolution of assessment policy and practice in technician level vocational education. Using the example of an advanced level BTEC National programme in Engineering in one college in the UK, the paper highlights how the origins of current assessment practice lie in genuine concerns since the late 1950s about the appropriateness of examination-based assessment for assessing technician engineering skills, resulting in a shift to teacher-based, criterion-referenced assessment and an emphasis on formative feedback. Data are presented from a case study of assessment practice in an Engineering Department of one college of further and higher education in the UK during the academic years 2006-2008, which investigated salient influences and considerations underpinning lecturers' constructs of assessment. The study found a departmental ethos of facilitating students to achieve a pass, and the use of assessment methods that would ensure that students got through. However, lecturers were dubious whether their assessment practices developed the proficiency required for students' progression into HE or employment, and their practices did not appear to have a strong educational or occupational rationale for their approach. We argue that the limitations of teacher-based, criterion-referenced assessment and associated formative assessment practices, of which our study provides an example, contribute to a temptation to simply return to what is deemed more rigorous assessment through examination, which however may well bring back the problems identified in the past, of inappropriate approaches for assessing technician level skills associated with low success rates.

Keywords: teacher-based assessment; criterion-based assessment; formative feedback; vocational assessment; technician engineering education; further education; BTEC

Introduction

Over the past forty years, teacher-based criterion-referenced assessment and formative

feedback have received international attention as a means of recognising and facilitating student achievement across school and vocational sectors of education (Tveit, 2014; Räisänen and Räisänen, 2014). In England since the late 1980s, criterion-referencing has increasingly underpinned the assessment of qualifications such as General Certificates in Education (GCSEs), A-levels, the International Baccalaureate, and higher education programmes. Criterion-referencing has also been widely used in vocational qualifications such as BTEC National qualifications, which are the focus of this paper. BTEC Nationals first introduced criterion-based assessment in the mid-1980s. BTEC assessment of the 2000s is based on the achievement of specified assessment criteria, and assessment is underpinned by formative feedback, which is now integral to the ethos of the qualification. However, concerns have remained about the rigour of these assessment practices and the extent to which they may support students' progression into HE or employment, without necessarily ensuring the achievement of the proficiency required to sustain such progression. The term progression in this context is used to refer to a student's transition beyond their BTEC Engineering qualification, and on to HE study or into employment as a technician engineer or trainee engineer.

This paper examines these issues by focusing on assessment practice in engineering courses at level 3 (European Qualifications Framework level 4[1]), based on a study of technician level engineering provision in the UK. In this field, level 3 vocational qualifications have a long tradition of forming an essential and integral part of the education and training of technician engineers (Foden, 1951), and since the mid-1960s have provided an alternative route to A-levels (Sutherland and Pozzi, 1995). The current suite of BTEC Nationals[2] (now owned by Pearson Publishing) are considered valuable in the labour market, and are recognised and accepted by higher education for entry onto degree courses (Wolf, 2011).

However, throughout the history of technician engineering education, concerns about assessment practice have been raised. One of the major criticisms levelled against the assessment regime of National engineering courses in the 1950s and 1960s was its detrimental impact on student success rates, with too many students failing their courses (Crowther, 1959). The Technician Education Council (TEC) programmes introduced in the 1970s offered a radical departure in assessment practice, based on the recommendations of the Haslegrave Committee (Haslegrave, 1969). The characteristics and ethos of these programmes still resonate with modern day BTEC assessment of technician engineers. However, in contrast to earlier concerns about the number of student failures, current BTEC assessment practice is criticised for allowing students to succeed, when, it is claimed, their level of knowledge and skill may not be sufficient to prepare them for progression into employment or on to further study (Sutherland and Pozzi, 1995; Mustoe, 2006). Based on a case study of BTEC National assessment practice within one Engineering programme area in a further and higher education college in the UK, this paper considers how a 'pass' culture may now prioritise progression over proficiency, at a point in time when reforms that favour examinations and external assessment are proposed once again to address past failings. While the paper focuses on a particular instance of assessment practice, recent research indicates continuing and widespread interest in teacher-based assessment across all sectors of education (Baartman et al., 2013; Black et al., 2011; Crisp, 2013; Crisp and Novaković, 2009).

The first section of the paper outlines the historical development of assessment in technician engineering education, leading to the BTEC National qualifications of the 2000s. The second section considers the development of criterion-referencing and formative assessment, which underpinned the teacher-based assessment practice in BTEC Nationals at the time of this study. The third section presents data from a study of lecturers' practices, which illustrate how criterion-referencing and formative assessment can be used in an

instrumental way, developing an ethos that prioritises getting students through over and above ensuring the learning of knowledge and skills that are needed by technician engineers. The paper concludes by cautioning against simply returning to what is deemed more rigorous assessment through external assessment and examination, which may well bring back the problems identified in the Haslegrave Report (1969), of inappropriate approaches for assessing technician level skills and low success rates, at a time of increasing demand for technicians and engineers in the economy (Engineering UK, 2015).

The evolution of assessment in technician engineering education in the UK

In the 1950s and '60s the 'National' courses, administered by Regional Joint Committees[3], were criticised for their consistently low student success rates (Foden, 1951; Ministry of Education, 1961). In Electrical Engineering for example, between 1930 and the 1970s, success rates were rarely above 60% (Bourne, 1984; Argles, 1964). One prominent reason given for low success rates was the assessment regime, which was based on end-of-year examinations, where students failed their whole year of study if they failed one examination, resulting in having to repeat an entire year of study (Crowther, 1959).

A step-change in technician education was initiated in the late 1960s when a government-instigated Committee on Technician Courses and Examinations presented its findings in the Haslegrave Report (see appendix for a summary of the changes outlined here). At this time, advances in technology and the increasing sophistication of engineering products were resulting in an increasing demand for well-educated and trained technician engineers. Haslegrave (1969) proposed radical changes to all aspects of technician education, particularly with regards to assessment practice. The committee considered external examinations to be an unsatisfactory way of testing the capabilities of technicians, and suggested examinations were very poor predictors of subsequent performance, such as

success at work. Instead, the report advocated teacher-based internal assessment, proposing the use of a variety of methods, and also changes in the frequency of assessment.

Based on Haslegrave's recommendations, the then UK Department of Education and Science (DES) introduced the Technician Education Council (TEC) in 1973. The concept of a course of study consisting of subjects in the Joint Committee National structure was replaced by a programme of study comprising self-contained units. No longer was a group of subjects to be successfully passed by end-of-year examination in order to progress (Birbeck, 1980), but each unit was stand-alone and could be completed in its own right. An emphasis was placed on teacher-based assessment, and students who worked reasonably hard were expected to achieve an award (Blakey and Stagg, 1978; Halliday, 1981). TEC assessment models were developed that encouraged broken-up summative assessment using end-of-unit tests, phase tests (sat at the end of a section of study), practical work, projects and assignments (Halliday, 1981). Another radical feature of the TEC assessment regime related to the use of referral if a student failed an assessment. TEC guidance stated a 'further opportunity should be given to the student to show that he/she has reached the appropriate standard', usually after remedial study (TEC 1979, Guidance notes 8, cited in Halliday, 1981, p. 176).

In 1983, the TEC merged with the Business Education Council (BEC) to form the Business and Technician Education Council (BTEC). In 1986, BTEC released a series of publications in which the use of criterion-referencing and formative assessment were stated as central tenets of assessment policy and practice (BTEC, 1986a). These two concepts underpin BTEC's assessment philosophy, and have evolved to significantly shape modern-day BTEC assessment practice (Wakeman, 2002; Torrance et al., 2005).

The rise of criterion-referencing and formative assessment

Criterion-referencing offered an alternative to the use of norm-referencing that had

underpinned assessment practice from the 1960s through to the mid-1980s. Norm-referencing is founded on psychometric principles, comparing individuals against defined norms, which places students in competition with each other (Glaser, 1994). A major criticism of norm-referencing is that it provides little or no information about what people can do or how proficient they are, and 'is bound to make at least half of those involved appear and feel like failures' (Wolf, 1993, p. 5). In contrast, criterion-referenced assessment endeavours to assess competence or achievement, using a broad range of tests that consider each individual against given criteria (Gipps, 1994). Levels of achievement associated with norm-referenced assessment occur after teaching and testing and relate to comparing and ranking students, whilst those associated with criterion-referenced assessment are established before teaching and testing commence, and so recognise achievement by all individuals who achieve established criteria (Biggs, 1999).

A second major development resulting from the opening up of the assessment debate in the 1960s, was the differentiation of formative assessment (to assist learning) from summative assessment (to report achievement). Michael Scriven and Lee Cronbach are acknowledged as originators of formative assessment, although it was Benjamin Bloom in conjunction with Thomas Hasting and George Madaus in the early 1970s who, through their Handbook of Formative and Summative Evaluation, helped teachers become aware of the different purposes of assessment, and expose them to new methods of assessment to improve teaching and learning (Bloom et al., 1971; Newton, 2007). Bloom and colleagues stressed the benefits of a range of testing methods and the use of formative assessment as an integral part of classroom practice for both students and teachers.

Both formative and criterion-referenced assessment gained increasing prominence across all education and training provisions during the 1980s and 1990s, but were particularly prevalent in the vocational sector through the implementation of workplace competence-based National Vocational Qualifications (NVQs) (Raggatt and Williams, 1999; Jessup,

1991), and have been associated with BTEC assessment since 1986 (BTEC, 1986a; BTEC, 1986b). Within BTEC assessment, a literal form of criterion referencing was used, which required students to show 'satisfactory performance' against all criteria to achieve a pass. This was a departure from the original TEC/BTEC assessment practice of the 1970s and early 80s, which apportioned marks to solution points and awarded grades at prescribed levels of numerical scores (Edexcel, 1996). Another aspect of BTEC assessment practice instigated in 1986, continuing thereafter, related to the use of assignments as both an assessment and learning method (BTEC, 1986b). Using assignments as an assessment method was not new, but the emphasis on their diagnostic and formative purposes was (Black and Dockrell, 1988).

Throughout the 1990s the development of BTEC Nationals became side-lined with the then Conservative government's emphasis on the introduction of a suite of General National Vocational Qualifications (GNVQs). However, because BTEC qualifications were well-established (Raggatt and Williams, 1999) and still being offered in colleges (Dearing, 1996), BTEC issued 'new' National qualifications in 2002. These new Nationals, influenced by the outcome-based model used in GNVQs, placed stronger emphasis on criterion-referenced assessment and formative feedback (Ecclestone, 2010).

Despite the proposed positive attributes of both criterion-referencing and formative assessment, there is much research evidence across both general and technical education courses, to show that these concepts can be problematic to implement in practice. One of the principal problems associated with criterion-referenced assessment is defining explicit and unambiguous criteria (James and Knott, 1994; Harlen, 2007). In the early 1990s, Alison Wolf's (1993) research found problems with interpretation which could lead to much subjectivity associated with what were intended to be clear and unambiguous criterion-referenced outcomes. Perfect transparency or explicitness of criteria (Jessup, 1991), however detailed the definition or atomised the objectives, was not a practical possibility. Wolf's

findings showed that specifications provided minimal guidance to test developers as to the level of difficulty and mastery to be assessed. Wolf also highlighted concerns associated with a decentralised criterion-referenced assessment system demanding 100% compliance to a written standard, such as BTEC Nationals. She argued that implementation of decentralised criterion-referenced specifications rely on common understandings to help develop and implement standards, and commented:

ambiguity or economies with the truth very quickly become institutionalized. What is more, there is no way of knowing whether one centre applies its assessments more accurately or unambiguously or allows more compensation than another, and therefore no control over how much ambiguity has been created, or how much 'slippage' from standards there has been. (Wolf, 1993, p. 21).

Subsequent studies drew similar conclusions (Ecclestone, (2001); Price, (2005)). In practice, 'criterion referencing requires considerable negotiation to arrive at agreed criteria and standards' (Dunn et al., 2002, p. 2), is problematic in ensuring consistent assessment between assessors, centres and Awarding Bodies (James and Knott, 1994), and therefore poses concerns about validity and reliability.

Similar concerns have been raised about the purported benefits of formative assessment. Although formative assessment is described as basic to good teaching (Biggs, 1999; Yorke, 2003), it does not have a well-defined and widely accepted meaning, which has hampered classroom implementation (Black and Wiliam, 1998; Ecclestone, 2010). Black and Wiliam's (2002) definition states that formative assessment pertains to all tasks creating *feedback* to students about their learning achievements, from where both students and teachers can take steps to improve classroom learning and teaching. In contrast summative assessment is often considered a terminal event, a judgement against referenced standards, goals and criteria, used for accounting, ranking and certifying purposes, suggesting that formative assessment opportunities have ended (Taras, 2007).

However, if feedback is information about the gap between the actual level attained and the reference level (Ramaprasad, 1983), it cannot be generated until a summary judgement is made against set standards, goals and criteria. With such 'a fuzzy distinction' between summative and formative assessment in the literature (Knight and Yorke, 2003, p. 34), it is easy to see why teachers in the pressurised and time-constrained environment of the classroom may struggle to understand and implement formative assessment, particularly as Knight and Yorke (2003, p. 38) suggest, assessors 'typically do not have any substantial grounding in the theory (limited as it is) and practice of assessment'.

Researchers have found that lack of clarity in the theoretical underpinning of formative assessment has caused confusion between formative and summative assessment, which has led to conflation of summative and formative purposes in practice (Taras, 2008). This 'uneasy conflation of two distinct models of evaluation and assessment' (Roos and Hamilton, 2005, p. 9) is a cause for concern as it inhibits the use and effectiveness of formative assessment within classroom practice. As a consequence this may mean 'either there is little genuine formative assessment (or what there is may not be recognised as such), or that teachers are struggling to meet both requirements and experiencing assessment overload' (Harlen and James, 1997, p. 365).

Assessment practice in vocational courses

Assessment practice in engineering courses has been a cause for concern over a number of years. An evaluation of TEC programmes in the 1970s expressed disquiet as to how these qualifications prepared students for undergraduate study, particularly with regards Engineering Mathematics (Moor et al., 1983). In the mid-1990s, Sutherland and Pozzi (1995) researched the changing mathematical background of students entering undergraduate Engineering programmes at four English universities, and found students entering via the vocational route, 'in most instances to be weaker than students with a poor A-level result'

(Sutherland and Pozzi, 1995, p. 6; similar findings from Shaw and Shaw, 1997). This was despite the fact that 'both the syllabuses [sic] and examinations of these [vocational] courses have high face validity and look very similar to those of more academic courses' (Gill, 1999, p. 560). Sutherland and Pozzi suggested it was the variability of BTEC assessment practice which was contributing to problems of student progression: 'BTEC students are assessed internally and this results in more variable quality' (Sutherland and Pozzi, 1995, p. 16; similar finding from James, 1995). In 2005, the UK Qualifications and Curriculum Authority (QCA, 2005) identified weaknesses associated with use of assessment and grading criteria and incorrect assessment decisions within BTEC National Engineering programmes. The QCA found great inconsistency in opportunities for re-assessment, ranging from very limited to unlimited, with some re-submissions occurring ten months after the final deadline.

These concerns are compounded by other studies that highlight issues about assessment practices and standards in vocational courses more widely. Ecclestone's (2002) research into GNVQs found criterion-referenced assessment, implemented through the use of assessment and grading criteria or 'bullet points' as they were colloquially termed, had a significant influence on both teachers' and students' micro-level assessment practice. Their focus on the criteria impacted negatively on both assessment and achievement. Teachers tended to use assignments that were broken into discrete and easily accessible tasks, and both teachers and students 'viewed assessment as 'meeting the requirements' and not about deepening learning' (Ecclestone, 2002, p. 167). If students did not meet criteria, teachers would refer work back to fill gaps. Referrals proved to be common practice in Ecclestone's study, as within each unit most students had to repeat parts of assignments more than once to meet the criteria for pass. Feedback given to students was often aimed at closing gaps in coverage as opposed to enriching learning, a response to teachers wanting students to pass but at the same time being scrutinised for compliance with national standards. Ecclestone

described formative assessment in this context as akin to a 'pre-emptive extension of summative checking, tracking and evidencing' (Ecclestone, 2002, p. 167).

Research by Boys (2000) into assessment in Advanced GNVQ Business Studies also found 'confusion between formative and summative assessment' (Boys, 2000, p. 311). Formative and summative assessment became part of the same process, as students were permitted to draft and redraft assessments, and resubmit assignments multiple times. He found that criterion-referencing lacked 'precision about the standards to be achieved' and there was a 'failure of internal and external verification[4] to establish high standards' (Boys, 2000, p. 311). Both Boys' and Ecclestone's research also suggest how cultural considerations can have a significant impact on assessment practice:

engagement within any 'assessment community' occurs within largely tacit boundaries formed by expectations of students' ability, motivation, dispositions to learning and their prospects for progression into jobs or more education (Ecclestone, 2002, p. 171).

In an exploration of the impact of different modes of assessment on achievement and progress in the Learning and Skills Sector, Torrance (2007, p. 285) notes an 'overall orientation towards the pursuit of achievement', with an 'overwhelming culture of support for learners/candidates at every level and across every sub-sector of the Learning and Skills Sector'. This was in part, attributed to the 'high stakes accountability and financial insecurity' (Torrance, 2007, p. 292) that institutions experience relating to funding. Torrance et al. (2005) use the term assessment *as* learning to describe a negative focus on criteria compliance, as opposed to assessment *for* learning (Wiliam et al., 2004), which indicates a positive emphasis on developing learning. Thus within the FE sector, formative assessment on vocational courses is often associated with instrumentalism, where assessment comes to dominate content, process and outcomes of education, and formative and summative assessment practices become almost indistinguishable from each other.

The mounting concern about vocational courses and their assessment outlined above culminated in a UK government review undertaken by Professor Alison Wolf in 2011. Wolf (2011, p. 76) emphasised that 'the changes wrought over recent years have seen a systematic deskilling of the quality of provision with the emphasis on achievement of a qualification being primary and the dumbing down of the content, quality and rigour.' In the next section of this paper we show how the concerns raised in Wolf's report unfolded in the assessment practices of one college of further and higher education in the UK in the decade preceding the report.

BTEC Engineering assessment practice in one college in the UK

The study reported in this paper sought to uncover how BTEC assessment practice was constructed and functioned at the micro-level of classroom practice, in a BTEC National Engineering Programme offered in one college of further and higher education in the UK. During the period of this research, the college had 817 students enrolled on its full-time courses, of which 109 were studying engineering courses and of those, 35 students were enrolled on BTEC National Engineering Programmes. It should be noted that the College was not subject to the same funding arrangements as colleges in England and Wales, which receive funding relating to annual student retention and achievement rates. The College in this study received funding purely based on the number of student enrolments in each academic year.

During 2006-2008, one-to-one, semi-structured interviews were undertaken with seven lecturers and thirteen National technician engineering students, to ascertain their perspectives on BTEC assessment practice (Carter, 2012). Ethical approval for the study was received from the University of the West of England's Ethics Committee (March 2007), and all data have been anonymised; names used in this paper are pseudonyms. The fieldwork was undertaken by one of the authors (Carter) in the college in which he worked. Although

concerns are expressed about the validity of such insider research (Burgess, 1984; Ashcroft, 1996), it is due to the fieldwork being undertaken by a practitioner researcher, that more detailed insights into local assessment practice were gained. This helped to overcome the problems in gaining access to examples of assessment and assessment instruments faced by researchers such as Sutherland and Pozzi (1995, p. 50), who found that lecturers on BTEC Engineering courses in their study were 'often very reluctant to make their assessment instruments available for analysis'.

In this paper, data from the lecturers are presented and discussed. The seven lecturers involved with delivery of the programme were initially interviewed in July 2007. They were issued with copies of their interview transcripts a year later to determine if changes to their assessment practices had occurred. All the lecturers were male.

Table 1 about here.

Curtis (Assistant Programme Manager), Dominick and Neville had taught on BTEC programmes at the college for ten or more years; Marvin and York (Programme Manager) for five or more years, but Bernard and Boris were new to the college. Boris, Curtis and York had taught on BTEC programmes at other colleges, whilst Bernard had taught on City and Guilds programmes. At the time of the study, two of the lecturers were External Verifiers for the Awarding Body Edexcel, one (York) with responsibility for three colleges in England, and one (Marvin) responsible for five colleges and eight schools.

It should be noted that in what follows, we do not address specifically issues related to key skill or functional skill attainment, though we recognise that achievement in these areas has given rise to considerable concern regarding the attainment of level 3 vocational learners (see for example Shaw, (2007)). The requirement for learners to achieve additional key skills qualifications as part of different qualifications has a complex history in England, and at the time of our study, key skills did not form an essential component of BTEC Nationals. Nevertheless, we recognise that sufficient knowledge of mathematical skills in particular is a

critical concern in relation to engineering education (Moor et al., 1983; Sutherland and Pozzi, 1995; Shaw and Shaw, 1997) and forms an important part of the wider picture of learning and assessment in vocational qualifications.

The construction of assessment practices

At the time of this study, BTEC National qualifications were assessed through tasks prepared by teachers for their own students, which were marked internally, and were then subject to internal and external verification. Internal verification involved lecturer peer review of all assessment material and a sample of students' scripts. External verification involved review by the Awarding Body's appointed representatives, of a small sample of assessment tasks and associated students' work, undertaken to monitor standards and coverage of the lecturer-written assessments and lecturer decision-making when assessing their students' work.

All assessments devised and decisions made by lecturers were based on the learning outcomes specified by the Awarding Body for each BTEC unit. These learning outcomes are stated in the form of assessment criteria, and Edexcel emphasised that to achieve a pass a learner must have satisfied all the pass assessment criteria (Edexcel, 2002; Edexcel, 2010). This approach to assessment is akin to that used in competence-based occupational NVQs, where competence is defined as the demonstration of all criteria listed in a particular unit (Wolf, 1995; Colley and Jarvis, 2007).

On the one hand, therefore, lecturers had to meet the requirements of the Awarding Body. On the other, they had considerable input and influence over the construction of assessment and the interpretation and application of the assessment criteria. As Boris, one of the Engineering lecturers commented:

I feel there is a bit of responsibility on me to maintain a standard, because nobody is going to disagree with it, so I could let people through that I felt were weak, or I could fail people

being pedantic. So there are some grey areas, I don't think that the assessment as such is exact. [Boris]

Moreover, there was a driving assumption, that the philosophical underpinnings of BTEC qualifications only offered lecturers opportunities to pass students and not fail them:

How, or what the actual [BTEC] philosophy for failing people is quite, you know, there seems to be, you are given the opportunities to pass people, you are not really given the opportunities to fail people. [Boris]

While lecturers' assessment practices worked within Awarding Body regulations and requirements, they were also strongly influenced by their perceptions of students' orientation to study, their capabilities in relation to college study, and their likely future progression route. A typical pass grade student was defined as one who 'turns up and does what he is told' [Marvin, Lecturer], who 'tends to give you back what you have given him' [Curtis, Lecturer] and someone who 'has just slugged his way through' [York, Lecturer]. This type of student fitted with lecturers' understandings of Awarding Body expectations:

I think what they [BTEC] are looking at are people who are generally interested, will stick at it and eventually get through. [Boris]

Perceptions of the progression path from the National also influenced lecturers' constructions of assessment practice. Most students were expected to enter employment, so that preparation for the assessment demands of further study were put to one side:

I do say though that I let my students down dramatically badly if they want to go to uni, as it gives them no insight into uni exams. I think that is a real let down, however I do feel that I am not here for the odd person who goes to uni, I feel that I am here for the 9 out of 10 lads who just progress, get a job locally and crack on with life. [Dominick]

However, this approach also affected students who might seek to progress on to the BTEC Higher National Programmes, rather than university. York suggested that the piece-meal approach of BTEC National assessment and the methods used did not develop students'

cognitive skills, and so hampered their preparedness for Higher National study:

I think the way we set the Nationals it is not helping them to progress to Higher Nationals, it is not trying to develop this thought process, so overall I think that the methods we are using are stymieing. .... It goes back to passing that particular bit and forgetting it, so it goes back to your question on progress. So they may have passed but they have not progressed as they cannot put it together. [York]

Lecturers accommodated their perceptions of students through various aspects of assessment practice. A wide variety of assessment methods were available to lecturers, although the most common across the majority of units was the open assignment, and within Mathematics and Science units, the open-book test. Open assignments are written assessments that can be completed outside of the classroom and submitted on or before a specified date, usually within a two or four week timeframe. In contrast, open-book tests are written assessments undertaken under exam conditions in a classroom, but within which students can access their handouts and notes. Open-book tests are usually of one or two hour duration.

While open assignments and open-book tests were the most common methods used to assess students, four lecturers expressed a preference for written closed-book tests or examinations, because they were traditional, unseen, and showed understanding [York], required preparation and retention of knowledge over a year [Curtis, Bernard], proved authenticity and focused the students. Marvin emphasised: 'an exam is the ultimate summative assessment'. However, at the time of this research, exams and closed-book tests were not used, because of lecturers' perceptions of students' capabilities, and concerns over low success rates:

The problem we have very simply, I believe, is that the level of students that we have here will not do the work required to pass an exam. So what they will do is that they will turn up to the exam ill-prepared if at all and fail, a lot of them. [Marvin]

In any case, assessment through tests did not solve the question of the level of achievement required to pass. Marvin explained the problem as he saw it:

… you have to say to yourself how do you decide what a pass is and this is where I see a problem with the people [lecturers] who set [their own] tests like this, their problem is when has the student passed the criteria? Does he have to answer every question 100%? [Marvin]

In practice, assessment practices had developed that aimed to get students through. Lecturers used classroom-based worked examples to prepare students for assessments, an approach aimed at allowing the majority of students to achieve a pass without the need to resort to additional study outside of the classroom, thus accommodating their perceptions of a typical pass grade student. From a comparison of students' classroom notes and handouts with associated assessment questions, a strong overlap was found between questions used in classroom lessons and those set in assignments and tests with regards format, wording and tasks, the only differences being changes in numerical values used. There was a sense of lecturers providing students with an array of focussed examples and questions to help prepare them for assessments, and in particular open-book tests, where the students could access reference information, for example through lecturers' workbooks.

When developing assessments, a careful balancing act was required, in order to comply with the Awarding Body requirements whilst endeavouring to accommodate lecturers' perceptions of students' capabilities, as described by Dominick:

I look for questions that fit the performance [assessment] criteria. That is probably my prime objective, because if I don't then the IV [Internal Verifier] is going to get you out. I then have to balance what I feel is a fair question. Now this is where your national standard comes. We all know, I can ask a quadratic question, or I could ask a circuit question of these students, that there is no hope in hell that they will ever answer. …. I have to get a balance there and that is probably, in my mind, maybe one of the more difficult things to do. [Dominick]

Ambiguity in the assessment criteria could be used to accommodate perceived differences in

capabilities of different cohorts of students, by limiting or extending content coverage and the academic difficulty of the content. Curtis explained:

you are always looking at your cohort and think I can stretch these lads a bit, because every one of them they are coming through with this ability, so we will do an assignment which is deeper in-depth. You might get a cohort who just scrape through and come to you and you might change your philosophy on it. You're still describing 3 manufacturing processes, but you might choose different ones, you might choose higher tech ones for one group, or lower tech ones for another group. You're still meeting 3 criteria. [Curtis]

Dominick described a similar process:

[Dominick] *let's say I've got 10 students, I need to think how deep is this question, that 9 of them will be able to get it and one of them will have to work quite hard to get it. So you have to say to yourself, pass criteria, who is the weakest student?*

[Interviewer] *Is that how you would gauge it?*

[Dominick] *Maybe not on the class you have got, but on the classes that you've had. The more experience you have got the more you get it.*

[Interviewer] *So your national standard has like evolved over the…?*

[Dominick] *I have never really looked at it that way, but when I look back at what I think about, I look at 80 to 90% of my students over the last 5 or 6 years, in this subject area, can pass this without really going to town on it.*

[Interviewer] *When you say 'not going to town', does that mean doing work outside of the lesson?*

[Dominick] *No I think maybe to the point of if they haven't just read it, then they will probably get referred and they could do it on a second retake.*

Dominick's comment about getting referred relates to the Awarding Body stipulation that students should have opportunities to resubmit work (Edexcel, 2006; see also Edexcel, 2010b). Marvin explained how this policy requirement was applied in practice:

you can't really do anything else for the simple reason that if you suddenly turn around and say I will not accept any more from you, the student has failed. .... With pass grade I am pretty reasonable, if people continue doing it I will continue [assessing] it until we run out of time. [Marvin]

Students' work was therefore 'referred' back to them, rather than awarded a fail grade. The referral system then involved the use of feedback and support, in line with Awarding Body policy, to help students who had not yet passed to develop their understanding.

Rather than providing lengthy written feedback, students whose work was 'referred' were supported primarily through individualised, verbal feedback, as outlined by Dominick:

on a one-to-one basis I am inclined to actually tell them, you need to do this; this is no good, turn to page 86 in the workbook. I tend to do that. I will give them a lot of direction that way. [Dominick]

Using the original assessment as the basis of further re-submissions was common practice amongst all lecturers, even when a student had referrals on the same assessment multiple times. Even where the assessment method was a time-constrained, in-class open-book test, the same assessment paper could be re-used multiple times. In one Science test for example, four students achieved merit grade during the first sitting, two more on the second sitting and one on the third attempt at the same paper.

Lecturers sometimes changed the assessment method during referrals to help students complete an assignment, especially where they only had 'a few bits missing':

The other thing I will do sometimes is oral questioning. I have done that with a few students. I have got there and got them to think about it on their feet and give me an answer and sometimes, with a few students, that is how I have dealt with it, where they have got bits of it and a few bits missing, I have actually done it orally and signed it off. [Marvin]

Yet at the same time there was concern amongst lecturers about the referral process. Marvin worried about repeated submissions of the same assessment:

Well in the end you can end up doing it for them and there are times when I say to them, you need to go away and do this and sort it out for yourself. And the problem with that is that if you are not careful, they will just go and copy from somebody else. [Marvin]

Although Dominick spoke above of devising assessment to suit the majority of students, who would progress into the local labour market, this high level of coaching through to a pass was not necessarily what lecturers intended. Boris, for example, commented that multiple submissions of the same assessment did not prepare students for future employment, but suggested that this was an Awarding Body requirement:

On the BTEC philosophy of, there are no max retakes, this student has got to pass in a unit, but he couldn't go into a company and do a good job. [Boris]

As his comment indicates, there was a contradiction at the heart of their practice, between the 'pass' culture aimed at getting students through, and lecturers' concerns that their approach would not prepare students adequately for progression, even to local employment.

Discussion and conclusion

The construction of teacher-based assessment practices in the Engineering department in this study shows how assessment approaches such as criterion-referencing and formative assessment, intended to support learning and encourage achievement, can turn into a means of getting students through, with less attention paid to the levels of knowledge and proficiency achieved. The approach in the case study department became one of assessment *as* learning (Torrance, 2007), where assessment dominated decisions about content and learning processes. There was a focus on criteria compliance at the expense of learning, and formative assessment practices, particularly a referral system, were used extensively in pursuit of student achievement.

However, while Torrance (2007) attributes this in part to a context where accountability and financial insecurity of funding is the norm, this was not true for the

Engineering department in this study. Due to the different funding regime in the region of the UK in which the college was located, funding was based on the number of students enrolled each academic year, and not the number of students retained or successfully passing the course. There were no concerns expressed by lecturers in the interviews that their approach was influenced by retention and achievement rates or their own job security.

Nevertheless, the construction of the teacher-based assessment practice in the Engineering department involved interpretations of BTEC policy that were based on the importance of getting students through. These practices did not appear to be based on either a strong educational or occupationally-oriented rationale, and lecturers expressed conflicting views about the appropriateness of their approaches to assessment, suggesting that achieving a pass took precedence over proficiency, and that students were not just ill-prepared for further study, but also for entry into the labour market.

The practices described above have been associated with the perverse incentives that are created under current conditions related to audit, league tables and so on. However, current practices can also be traced back to very different concerns that were raised in the 1950s and '60s as highlighted in the early part of this paper. The Haslegrave Report (1969) instigated changes in response to arguments that inappropriate assessment practices resulted in excessive numbers of students failing technician level engineering qualifications. The introduction of criterion-referencing and formative assessment was intended to remedy this problem, by enabling and recognising success, rather than identifying failure. Although lecturers in this study were not necessarily aware of it, the 'pass' culture in the Engineering department could be said to have evolved not just from current interpretations of Awarding Body policy, but out of a historical concern about the possibly inappropriate high failure rates of technician-level students in the past. The reservations voiced about current practices highlight how criterion-referencing and formative assessment have turned this problem on its head, and resulted in concerns about possibly inappropriate *success* rates.

The recent Wolf review of vocational education in England (Wolf, 2011) has led the UK government to set out requirements to increase the rigour of assessment within vocational qualifications (DfE, 2014). This has already involved a tightening up of internal assessment from September 2014, and further proposals for the implementation of a greater proportion of external assessment within the next generation of BTEC Nationals (Pearson, 2014a; 2014b). These actions may go some way towards addressing the problems highlighted in this paper, and we would support the move to a combination of both internal and external assessment methods within future vocational qualifications. However, we would distinguish this from privileging what is often deemed more rigorous and robust assessment by external *examination*. External examinations could prove counter-productive and have the potential to return to the problems identified at the time of the Haslegrave Report, of inappropriate approaches for assessing technician level skills, leading to low success rates, at a time when once again there is considered to be a significant, long-term requirement for technician-level engineers.

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[1] *Referencing the Qualifications Frameworks of the UK to the European Qualifications Framework* http://scqf.org.uk/content/files/europe/QFUK_Joint_Report_-_Updated_March_2010.pdf. Accessed November 2014.

[2] BTEC originally stood for the Business and Technician Education Council but was later renamed the Business and Technology Education Council (Fisher, 2003). BTEC was set up in 1983, to offer vocational qualifications, with the purpose of advancing the quality and availability of work related education for those in, or preparing for, employment. In 1996 BTEC and the University of London Examinations and Assessment Council (London Examinations) merged to form a new company, Edexcel. BTEC continues to be used as the brand name for work-related qualifications offered by Edexcel, which since 2003 has been owned by the private company Pearson. The BTEC National qualification introduced in 1983 was reclassified as the BTEC Level 3 National Diploma under the National Qualifications Framework (Edexcel, 2009). The qualification is still designed to provide the knowledge, understanding and skills needed for

employment and for career development of those in employment, but it is also intended to prepare for progression into higher education, degree and professional development.

[3] The Regional Joint Committees consisted of representatives from industry, and professional and educational bodies, and were responsible for determining the syllabus and standards of the examination (Crowther, 1959).

[4] The purposes of external verification are to monitor assessment practices and procedures to ensure that national standards are applied consistently (Boys, 2000).

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Table 1: Profile of the Engineering Lecturers in the study (n = 7)

Lecturers' teaching background				BTEC units taught to level 3 BTEC engineering students	
Pseudonym	**Qualifications**	**Length of employment at college**	**Teaching experience prior to college**	**2006-07**	**2007-08**
Curtis	City &Guilds (C&G) Full Technological Certificate (FTC) in Production Engineering; Higher National Certificate (HNC) in Production Engineering.	10 years	Yes	1 unit	2 units
*Marvin**	A-levels (Maths, Physics, Chemistry); Bachelor of Technology (BEng Hons) in Production Engineering and Management.	7 years	No	1 unit	3 units
Neville	A-levels (Maths, Further Maths & Physics); Bachelor of Engineering (BEng Hons) in Electrical and Electronic Engineering.	>10 years	Yes	None**	2 units
Dominick	Technician Education Council (TEC) Certificate in Mechanical/Production Engineering; HNC in Production Engineering; HNC in Electrical & Electronic Engineering; Bachelor of Engineering (BEng Hons) in Manufacturing Engineering.	>10 years	No	4 units	3 units
*York**	TEC Certificate; Higher Technician Certificate (HTC) in Mechanical Engineering; Bachelor of Science (BSc) Mechanical Engineering.	5 years	Yes	None**	1 unit
Boris	BTEC National in Mechanical Engineering;	1 year	Yes	2 units	None**

Lecturers' teaching background				BTEC units taught to level 3 BTEC engineering students	
Pseudonym	**Qualifications**	**Length of employment at college**	**Teaching experience prior to college**	**2006-07**	**2007-08**
	Higher National Diploma (HND) in Mechanical Engineering.				
Bernard	C&G Electrical Installation	1 year	Yes	None**	3 units

Note: * BTEC External Verifier at time of the study

** Taught BTEC units but not with research cohort of students

APPENDIX

Table 2: Development of level 3 vocational qualifications and assessment in England

Date	Development
1920s	'National' qualifications introduced in England for Mechanical Engineering. Administered through Regional Joint Committees responsible for determining the syllabus and standards.
1959	Crowther Report on the education of 15-18 year olds. Expressed concerns about high wastage and failure rates associated with the then National qualifications, which it attributed primarily to the assessment regime.
1961	Government White Paper *Better Opportunities in Technical Education* proposed solutions to address wastage highlighted by Crowther Report.
1969	Government instigated Committee on Technician Courses and Examinations, leading to the Haslegrave Report, which further highlighted the high wastage and failure rates from National qualifications. The report proposed radical changes to all aspects of technician education, particularly with regards to assessment practice, with the intention of increasing achievement rates.
1973	Technician Education Council (TEC) introduced by the UK Department of Education and Science (DES), which instigated a radical departure in assessment ethos and practice to that of the previous fifty years, based on Haslegrave's recommendations.
1974	Business Education Council (BEC) established by UK Government with similar remit to TEC, but within the business sector.
1983	TEC merged with BEC to form the Business and Technician Education Council (BTEC).
1986	BTEC released a series of publications in which the use of criterion-referencing and formative assessment were stated as central tenets of assessment policy and practice.
1991	BTEC changed its name from Business and Technician Education Council to Business and Technology Education Council.
1991	General National Vocational Qualifications (GNVQs) introduced by the Department of Education and Science and the Department of Employment, with the intention of replacing other vocationally-related qualifications, including BTEC Nationals.
1993	BTEC becomes independent of UK Government.
1996	BTEC and London Examinations merged to form awarding body Edexcel.
2002	Edexcel released new BTEC Nationals accredited to the National Qualifications Framework (NQF), which were significantly influenced by the outcome-based model used in GNVQs, and placed stronger emphasis on criterion-referenced assessment and formative feedback.
2003	Edexcel bought by the private company Pearson.
2007	BTEC Nationals updated in-line with revised National Qualifications Framework. All units internally assessed, not all units have to be passed to

Date	Development
	achieve the qualification, but a specified minimum aggregated point score has to be achieved across all units.
2010	BTEC Level 2 and Level 3 qualifications aligned to the Qualifications and Curriculum Framework (QCF) instead of the National Qualifications Framework. All units have to be passed to achieve the qualification.
2011 (March)	Findings from the Government instigated *Review of Vocational Education* published in the Wolf Report, which included a recommendation for more rigorous assessment, including a percentage of external assessment.
2011 (May)	Government response to the Wolf Report accepted and proposed action in response to Wolf's recommendations.
2014	*Guide to Internal Assessment for BTEC Firsts and Nationals* issued by Pearson, instigating increased academic rigour of teacher-based internal assessment from September 2014. Tightening up of submission deadlines, limiting opportunities for re-submissions and retakes. Proposed a move to 30% external assessment of BTEC Level 3 qualifications from 2016.